SUBSTITUTE SPECIFICATION

MARKED UP VERSION

CLOSURE SYSTEM FOR TUBULAR ORGANS

Field of the invention

[0001] The present invention relates to surgical devices for adjusting the diameter of tubular organs such as the esophagus, the stomach, the colon or the urethra. Such devices may be used as sphincters (e.g. as anal or urinary ~~sphincters~~sphincters) or for the control of obesity. ~~It more precisely~~More particularly, the present invention relates to surgically implantable adjustable rings for encircling said tubular organs.

~~State of the art~~Background of the Invention

[0002] Surgical devices for adjusting the diameter of tubular organs have been disclosed in the prior art, for example, ~~are disclosed~~ in patent documents US 5,658,298, US 6,601,604, FR 2 823 663, WO 01/85071 and WO 03/059215.

[0003] ~~The~~In particular, the device disclosed in International Publication No. WO 03/059215 has an open ring shape ~~which~~that comprises a first and second end parts and ~~which~~that is designed to be closed around a tubular organ ~~towards its~~ at the two end parts. ~~by a~~A closure system ~~to adjust~~adjusts the diameter of ~~said~~ the tubular organ by forming the ring into a loop.~~, the~~ The first end part of the ring ~~forming~~ is shaped like a

sleeve ~~having a first and second open end parts and which~~ and is designed to receive the ~~ring~~ second end part of the ring, the ~~sleeve~~ main axis of the sleeve being defined along a direction ~~which~~ that is substantially perpendicular to the main direction of the ~~ring~~ first end part~~, the ring~~. The second part of the ring ~~furthermore comprising~~comprises instead ~~a locking protrusion~~ a hook-shaped extension that is adapted to ~~hold the border of the sleeve~~ capture the edge of the second end part of the sleeve, and thereby to secure the ring in a closed position.

[0004] Summary of the invention

[0005] An object of the present invention is to provide ~~an improved~~a closure system ~~for~~improved over the ~~previous cited prior art~~ devices in the prior art. This and other objects of the present invention are achieved ~~with the device as defined in claim 1.~~by providing a surgically implantable ring that can be adjusted in diameter. In one embodiment, a surgically adjustable ring constructed according to the principles of the present invention comprises an open ring body that is designed to constrict a tubular organ and that includes a closure system having a first and a second end parts.

[0006] The first end part includes a sleeve that has a first and a second portion and that is designed to receive the second end part of the closure system. A locking protrusion extends from the second end part and is adapted to engage an aperture in the sleeve, thereby securing the ring in a closed position.

Brief Description of the Drawings

[0007] The above and other objects and advantages of the present invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference numerals refer to like parts throughout, and in which:

[0008] FIG. 1 is a perspective view of an embodiment of the invention in a closed position; and

[0009] FIG. 2 is a perspective view of the embodiment of FIG. 1 in an open position.

Detailed Description of the Invention

[0010] An embodiment of the invention will be discussed in ~~a more detailed way here below together with figures 1 and 2~~greater detail hereinafter.

[0011] Referring to FIGS. 1 and 2, ~~The~~ adjustable ring 1 comprises a closure system having a first end part 3 and a second ~~4 end parts~~end part 4.

[0012] Ring 1 may be manufactured from any~~Any~~ suitable material, ~~can be used with the ring 1, e.g.~~for example, from a biocompatible elastomeric material. The external part of ~~the~~ ring 1 ~~can~~ may be more rigid than the internal part, ~~this later one having~~which has an internal diameter ~~which can be adjusted~~that is adjustable.

[0013] ~~The first~~First end part 3 ~~forms~~ is shaped like a sleeve ~~which is~~ designed to receive ~~the~~ second end part 4~~. The~~, while second end part 4 has an extension 11 ~~which contains~~containing adjusting means, for instance, a wire which can be pulled or pushed in order to adjust the ~~ring 1~~ diameter of ring 1.

[0014] The sleeve on first end part 3 ~~has a~~includes first end ~~part~~ portion 6, which is reinforced by a flange

12, and ~~a~~ second end ~~part~~ portion 7, which contains ~~a hole~~aperture 5 designed to receive and efficiently retain ~~a~~ protrusion 2, and which is ~~fixed to the ring~~ engages second end part 4.

[0015] For the purpose of closing or opening ~~the~~ ring 1, ~~the sleeve~~ second end ~~part~~ portion 7 of the sleeve is provided with an extension ~~forming a~~ defining flexible tab 9~~. The tab 9~~, which contains ~~a hole~~opening 10 situated close to ~~the sleeve hole~~aperture 5. The presence of ~~the hole~~opening 10 in ~~the~~ tab 9 provides several advantages, in particular ~~by preventing~~ the accidental opening of the closure system is prevented in situations where~~when the~~ tab 9 has to support forces, ~~which tend to fold the~~tending to bend tab 9 in the direction of ~~the~~ extension 11. ~~The~~ Such forces may be due to the movement of the patient, or of the organs of the patient, or to the fluid or bolus passing through the tubular organ.

[0016] The ~~zone~~ area between ~~both holes 5, 10~~aperture 5 and opening 10 is reinforced by ~~a~~ flange 8. The other sides of ~~the tab hole~~opening 10 are also reinforced by flanges 13, 14.

[0017] The shape of protrusion 2 ~~shape~~ is designed to closely match the shape of flange 8 ~~shape~~.

[0018] The invention is of course not limited to the above ~~cited example~~described embodiment. ~~For instance~~In another embodiment, ~~the hole~~opening 10 ~~can~~ may be replaced by a portion ~~being~~ that is more flexible than the remaining part of ~~the~~ tab 9. Such a more flexible portion ~~can~~ may be obtained ~~by different ways~~with different techniques, for example, ~~in~~ by making ~~the~~ that portion thinner than the rest of tab 9. In still another embodiment, the second portion of the sleeve may

partially overlap the second part of the closure system when the ring in in closed position.

[0019] The invention ~~can be used for different uses~~may be advantageously used in a variety of applications, for instance, as a sphincter or as a gastric ring.

Abstract of the Disclosure

[0020] In one embodiment, a surgically~~Surgically~~ implantable adjustable ring ~~(1) comprising~~comprises a ring body, which includes a closure system having first ~~(3)~~ and second ~~(4)~~ end parts~~ and which~~. The ring body is designed to be closed around a tubular organ ~~towards its two end parts (3, 4)~~ by ~~a~~ the closure system, ~~(2, 5) to adjust the diameter of said~~constricting the tubular organ by forming a loop. ~~, the~~The first end part ~~(3) forming~~is shaped like a sleeve having a first ~~(6)~~ and second ~~(7) open~~ end ~~parts and~~portions, ~~which~~and is designed to receive the ~~ring~~ second end part ~~(4)~~of the ring. ~~, the sleeve main axis being defined along a direction which~~ The sleeve is substantially perpendicular to the main direction of the ~~ring~~ first end part ~~(3)~~of the ring, and the ~~ring~~ second end part ~~(4)~~of the ring ~~furthermore comprising~~ includes a locking protrusion ~~(2)~~ adapted to hold the sleeve ~~(3)~~in position, ~~and thereby secure~~securing the ring in a closed position~~, characterized by the fact that the sleeve (3) comprises a hole (5) designed to receive said~~ by engaging the locking protrusion ~~(2)~~in an opening disposed on the sleeve.

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